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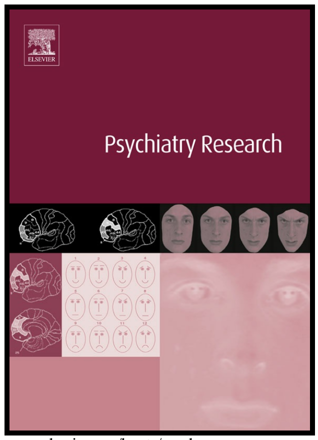

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# Understanding and treating amotivation in people with psychosis: An experimental study of the role of guided imagery.

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Abstract (200 words)

Psychological models propose that the amotivational negative symptoms (ANS) of psychosis are influenced by expectations of future events; both anticipatory success (believing one can achieve something, AS) and anticipatory pleasure (mentally pre-creating potential future experiences of enjoyment, AP). Mental imagery manipulations have been shown to change expectations across a range of settings, and may therefore enhance psychological interventions for ANS in people with psychosis. We set out to investigate the impact of a guided imagery manipulation on AS and AP in this group. Forty-two participants with psychosis and ANS completed measures of ANS severity, before random allocation to either a positive or neutral imagery manipulation. AS and AP towards a dart-throwing task were measured before and after the manipulation. Greater ANS severity was associated with lower levels of AS, but not of AP, irrespective of task performance. AS, but not AP, improved during both positive and neutral imagery manipulations, with no effect of imagery type. Anticipatory success is a candidate psychological factor influencing the severity of ANS in psychosis that may be changed by guided imagery manipulation. Imagery interventions are

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feasible and acceptable for this group: further investigation is needed of their mechanism of action and potential to improve functioning.

Key words: negative symptoms, imagery, amotivation, anticipatory pleasure, anticipatory success

# 1. Introduction

## 1.1 Psychological models of negative symptoms in psychosis

Negative symptoms affect over half of people with schizophrenia spectrum psychosis (Bobes et al., 2010) and are predictive of poor functional outcomes (Ho et al., 1998; Lysaker et al., 2004; Lysaker and Davis, 2004). Negative symptoms are conceptualised as loss, or 'deficit', symptoms (ICD-10, World Health Organisation, 1992), across two consistently identified subdomains: loss of volition/motivation ('avolition/apathy') and flattening of affect ('diminished expression') (Strauss et al., 2013; Kirkpatrick, 2014). The former, which we term 'amotivational negative symptoms' (ANS, Foussias and Remington, 2010) are considered to have the greatest adverse impact on quality of life (Fervaha et al., 2013; Foussias et al., 2011).

Amotivation in psychosis involves two psychological processes: low expectancies of success, and low expectancies of pleasure (Beck et al., 2011). Negative beliefs about future performance in a particular activity (or defeatist performance beliefs) are thought to result from past experiences of failure (Rector et al., 2005; Rector, 2004; Grant and Beck, 2009; Horan et al., 2010; Avery et al., 2009). Low expectancy of pleasure is considered to arise through difficulties with anticipatory pleasure (predicting and pre-experiencing future pleasure), which is both impaired relative to non-clinical controls, and associated with ANS (Gard et al., 2007; Oorschot et al., 2013). We have summarised this body of research in a single anticipatory deficit model of ANS (Figure 1). The model is consistent with neurophysiological studies, suggesting changes in the neural pathways mediating 'wanting', while 'hedonic' neural pathways, and consummatory pleasure (the immediate experiential pleasure of a primary reinforcer) are unaffected (Barch and Dowd, 2010; Kring and Barch, 2014). This consensus suggests focusing interventions on the difference between what is anticipated, and what is likely to be experienced, addressing both anticipatory cognitions and affective pre-experience. Role playing future events (e.g. Grant et al., 2012); broadening present positive affect to apply to a vision of the future (e.g. Johnson et al., 2012); and guided positive imagery of a future activity (e.g. Favrod, 2010), have all been shown to be helpful. However, no study to date has clearly delineated the specific role of mental imagery in the process of change. A better understanding of imaginal processes in ANS could inform more effective, targeted interventions.

## 1.2 Imagery

Mental imagery is a quasi-perceptual experience, whereby the sensory impact of an object or an event is brought to mind in the absence of external stimuli. Compared to other cognitive phenomena such as thoughts and beliefs, images, although drawing on memory processes (Addis et al., 2007), also elicit current emotional reactions to recalled or predicted events, as if the event were happening in the present moment (Holmes and Mathews, 2010). The 'hot' nature of imagery facilitates change in associated appraisals and emotional reactions across clinical and non-clinical settings (Holmes and Mathews, 2010). Imagery manipulations have been shown to reduce distress, improve functioning, reduce negative cognition, and increase resilience to negative mood (Ehlers and Clark, 2000; Holmes et al., 2009; Pictet et al., 2011). Indications that people with schizophrenia may experience difficulties mentally generating coherent scenes of future events (Raffard et al., 2010), and that difficulties imagining pleasurable future events are associated with apathy (Raffard et al., 2013) suggests that using guided imagery in therapy with this client group may be of particular value. Outside the clinical sphere, imagery manipulation is a common feature of sports psychology (Cumming and Ramsey, 2008). Whilst research in that field focuses on enhancing sporting performance, rather than improving mood or social functioning, it nevertheless provides a helpful lens through which to consider interventions for negative symptoms.

### 1.3 Rationale and hypotheses

The anticipatory deficit in ANS can be conceptualised as the absence of a required bridge between present stasis and future action: in neurophysiological terms, the dopaminergic fronto-striatal pathways through which goal-directed behaviours are hypothesised to be formulated, enacted, and evaluated (Kring and Barch, 2014). If a person is not able to anticipate that a proposed action will bring pleasure or success (i.e. to activate mental representations of carrying out that activity and a causal linkage with mental representations of pleasure or success) they will be missing key ingredients of motivation to act. The 'here and now' quality of mental imagery may provide this bridge, giving individuals a positive virtual experience of a specified activity with the intention of setting in motion the anticipation of pleasure and/or success (or, in neurophysiological terms, increasing 'wanting'), and subsequently changing attitudes and behaviours towards that activity (i.e. increasing motivation and the likelihood of action).

We aimed to test the anticipatory deficit model of ANS and to investigate the effects of guided imagery on the hypothesised psychological mediators of the relationship between the predisposing factors in the model and ANS. The purpose was to inform the development of cognitive behavioural interventions for negative symptoms.

Task-specific anticipation was measured in relation to a dart-throwing task. A similar task has been used in imagery studies in sports psychology (Nordin and Cumming , 2005), and was selected for this study as a normative leisure activity, requiring little physical effort (to reduce the confounding influence of physical fatigue and physical health problems), upon which performance could be readily quantified.

Firstly, we examined the association of ANS with the postulated mechanisms of change (anticipatory success, AS and anticipatory pleasure, AP) in a group of people with established psychosis and ANS. Secondly, we examined the impact of an experimental imagery manipulation on AS and AP.

We hypothesised that:

i) there would be a negative correlation between ANS and baseline anticipation (both AS and AP);

ii) guided imagery would have a positive impact on anticipation (AS and AP); and

iii) a positive imagery intervention (encouraging participants to imagine high achievement and pleasure in a task) would be more effective in changing anticipation than a neutral imagery intervention (encouraging participants simply to imagine carrying out the task, with no mention of success or pleasure).

Dart throwing performance was also measured, to ensure that observed associations at baseline between anticipation and ANS were not confounded by performance deficits.

## 2. Method

### 2.1 Participants

Participants were recruited from two inner-city, UK National Health Service community adult (≥18 years) mental health teams, specialising in treating people with an established (i.e. not first episode) schizophrenia-spectrum psychosis. Eligible participants were those judged by the care team to be experiencing ANS; severity of ANS was then confirmed by the researcher at screening.

## 2.2 Measures

### 2.2.1 Demographic characteristics

Age, gender, ethnicity (dichotomised into Black or Minority Ethnic, BME, or non-BME) and ICD-10 diagnosis (WHO, 1992) were obtained from participants' clinical records, with their consent.

### 2.2.2 Scale for the Assessment of Negative Symptoms (SANS, Andreasen, 1983)

The SANS is an observational and interview measure assessing five complexes of negative symptoms of schizophrenia. Inter-rater reliability is excellent (0.92; Andreasen, 1983); subscales have moderate to good internal consistency (co-efficients 0.58 to 0.88). Items are rated from 0 (absent) to 5 (severe). A total ANS score (range 0-35) was created by combining the avolition/apathy and anhedonia/asociality scales, which cluster together in factor analysis (Foussias and Remington, 2010). Internal consistency was good ($\alpha = 0.78$) in the current sample. Participants were stratified into three groups according to their global scores on the avolition/apathy and anhedonia/asociality scales: Low ($\leq$1 on both scales); Moderate (highest score of 2 or 3 on either scale); Severe (score of 4 or 5 on either scale).

### 2.2.3 Time Budget (Jolley et al., 2005)

Occupational and social impairment was assessed by this interview measure of activity during the past week, rated over four time periods/day from 0 (nothing) to 4 (filled with demanding activity); possible range 0-112. Participants with a recent relapse of schizophrenia spectrum psychosis obtained a mean weekly score of 50.1 ($SD = 19.7$, $n=276$), which correlated moderately with the SANS avolition/apathy subscale ($r=0.5$, $p<0.001$; Jolley et al., 2006).



### 2.2.4 Anticipatory success and pleasure.

Anticipatory success (AS) was measured by a simplified version of Nordin and Cumming's (2005) visual analogue scales (VAS), adapted for our task, and shortened to reduce participant burden. Participants rated their confidence that, of 12 dart-throws, they would score 'at least 1', 'at least 3', and 'at least 6' bullseyes, on three 100mm scales, from 0 ('Certain I won't') to 100 ('Certain I will'). The mean of the three ratings comprised the AS score. Anticipatory pleasure (AP) was rated along a single VAS from 'I don't expect to enjoy it at all' (0) to 'I expect to enjoy it a great deal' (100). Objective darts accuracy was measured at baseline only, as the mean proximity to the bullseye of 12 throws, with higher scores indicating more accurate throws (range 0-100).

## 2.3 Procedure

Once baseline self-report and observer-rated measures were completed, participants were randomised online (Sealed Envelope, 2014) to either a positive (n = 20) or neutral imagery manipulation (n = 22).

Magnetic 'darts' were thrown at a black canvas magnetic reversible board, placed on the floor, depicting a target of yellow concentric rings, scoring from 10 (outermost) to 100 (bullseye). Participants stood behind an oche 4 feet (121.92cm) away. In piloting, this placement reliably generated a normal distribution of scores.

Before commencing the task, all participants threw three practice darts. At baseline, participants completed VAS ratings of AS and AP before throwing 12 darts (Baseline performance measure). They then listened to a four-minute guided imagery recording via headphones (positive or neutral according to random allocation), completed a second set of VAS ratings and threw 12 more darts (T1). They then listened again to the same imagery script, completed the VAS ratings and threw a final 12 darts (T2).

The imagery script for the facilitative imagery condition followed that provided by Nordin and Cumming (2005), referencing both internal and external processes, guiding participants to imagine themselves feeling confident, enjoying the task, and throwing the dart to the bullseye (e.g. "…feel the sense of accomplishment, the feelings of confidence and satisfaction…follow it all the way, your perfect throw making it land straight in the centre of the board"). The script for the neutral imagery condition guided participants to imagine the task based on their realistic beliefs about their skills and ability at darts. Scripts are available as Supplementary Data.

## 2.4 Analysis

All statistical analyses were carried out using SPSS version 20 (IBM, 2011). Variables were normally distributed with the exception of AP, which was negatively skewed (Baseline:-1.05; T1:-1.33; T2:-1.01). The association of ANS with AS and AP (Hypothesis 1) was tested using correlational analyses, parametric for AS and non-parametric for AP. Task performance was controlled, to reduce the likelihood that expectations were influenced by an accurate perception of poor performance on the immediate task (rather than an overgeneralised bias towards assuming failure, based on past failures in other contexts). Demographic and clinical characteristics of the two imagery groups were compared using t-tests and Chi-square tests. As ANOVA, providing there are no outliers, is relatively insensitive to skew (Moore and McCabe, 2003), the effect of the imagery manipulation (Hypothesis 2), and of imagery type (Hypothesis 3) was tested using repeated measures ANOVA, reporting Greenhouse-Geisser adjusted statistics when the assumption of sphericity was not met. For H2, to test whether anticipation increased after each guided imagery recording, two univariate repeated measures ANOVAs were used to compare these scores across the within subjects factor of trial (x3; Baseline, Trial 1, and Trial 2). Bonferroni-corrected post hoc tests were used to investigate significant main effects and interactions. For H3, to test whether the imagery groups differed in their pattern of change in anticipation over time, two mixed, two-way univariate repeated measures ANOVAs compared AS and AP ratings for the two imagery groups (positive and neutral, between subjects) across the within subjects factor of trial. Partial eta squared effect sizes were reported and interpreted using the conservative convention (Cohen, 1988) 0.01 (small); 0.09 (medium); and 0.25 (large). Post hoc tests were used to investigate significant main effects or interactions.

Previous studies (Nordin and Cumming, 2005; Lang et al., 2011) show large average effects (Cohen, 1992) for pre-post change (f=0.34) and group x time interactions (f=0.45), suggesting a total sample size in excess of n=36 to achieve 90% power, with alpha adjusted to 0.01 to take account of multiple testing (Faul et al., 2007).

# 3. Results

## 3.1 Sample characteristics

Clinicians identified 117 potentially eligible participants; 52 were uncontactable, 23 declined or did not attend. Forty-two participants completed the study (62%, n=26, male; mean age 42.21 years, SD = 7.87 years; 74% BME).

Casenote diagnoses were: schizophrenia (n=31, 74%); schizoaffective disorder (n=4, 9%); acute and transient psychotic disorder (n=3, 7%); unspecified nonorganic psychosis, brief psychotic disorder, bipolar disorder, and severe depression with psychotic features (each n=1, 2%).

Activity impairment (time budget mean 46.40, SD 14.32) and ANS severity were moderate (Andreasen, 1983; overall ANS mean: 16.19, SD = 7.68; Lowest: 6.00, SD = 3.29; Moderate: 12.63, SD = 4.72; Severe: 22.10, SD = 5.17).

The two imagery groups did not differ significantly on any demographic or clinical measure or any baseline measure of darts ability, AS or AP (t values all < 1.73, $\chi 2$ values all < 5.3, p values all ≥ 0.07).

3.2 Hypothesis 1: ANS will be negatively correlated with baseline anticipation

Baseline AS (Pearson's r=-0.33,p=.03, n=42) but not baseline AP (Spearman's r=-0.04, p=0.81, n=42), was associated with ANS.

To examine whether the observed relationship between baseline anticipatory success and negative symptoms was affected by ability level, a partial correlation was conducted controlling for darts accuracy at baseline. Controlling for darts accuracy did not affect the size or significance of the correlation (r = -0.36, p = 0.02). Further, there was no association between baseline darts accuracy and ANS (r =0.12, p = 0.45), AS (r=0.10, p=0.54) or AP (r=0.08, p=0.63).

3.3 Hypothesis 2: Guided imagery will have a positive impact on anticipation

Table 1 shows the mean AS and AP ratings at baseline, T1 and T2. There was no relationship between scores on the practice task and baseline anticipatory pleasure (r = 0.08, p = 0.63) or baseline anticipatory success (r = 0.10, p = 0.54). As hypothesised, mean AS ratings improved significantly across the trials (F(2, 40) = 9.46, p = <0.001, $\eta_p^2$=0.19, medium to large effect). Bonferroni-corrected post hoc tests showed a significant increase during the first imagery manipulation from baseline to T1 (p = 0.04), and from baseline to T2 (p = 0.002), but not during the repeated imagery manipulation from T1 to T2 (p = 0.14), suggesting no iterative effect of the manipulation. AP rating increases across trials were not statistically significant (F(1.69, 40) = 3.08, p = 0.06, $\eta_p^2$= 0.07; small to medium effect).

Table 1 here

3.4 Hypothesis 3: Positive imagery will be more effective in increasing anticipation than neutral imagery

For AP, there was no main effect of imagery type ($F(1, 40) = 0.33$, $p = 0.57$, $\eta_p^2=0.01$) and no significant interaction between type of imagery and trial ($F(1.69, 40) = 0.70$, $p = 0.48$, $\eta_p^2=0.02$). For AS, there was no main effect of imagery type, $F(1, 40) = 0.02$, $p = 0.90$, $\eta_p^2<-.01$, and no significant trial x type interaction, $F(1, 40) = 0.46$, $p = 0.50$, $\eta_p^2= 0.02$. Effects were of small magnitude.

## 4. Discussion

### 4.1 Summary of findings

We set out to test an anticipatory deficit model of ANS, and to investigate the impact of a guided imagery intervention on anticipation during a darts task in participants with ANS in the context of established psychosis. We hypothesised that ANS would be associated with lower levels of baseline anticipatory success (AS) and pleasure (AP); that a guided imagery manipulation would increase AS and AP; and that positive imagery would be more effective than neutral imagery in increasing AS and AP.

Participants showed moderate levels of negative symptoms, and activity impairment comparable to established psychosis groups. The high proportion of BME participants reflects our local service demographic. As predicted, there was a significant relationship between ANS and baseline AS, even when controlling for performance. This builds on a finding by Avery et al. (2009) which is the only other report, to our knowledge, of an association of ANS with AS directly linked to an imminent task. Importantly, in our study, there was no relationship between an objective measure of task ability (mean darts accuracy score at baseline) and ANS, making it less likely that an objective assessment of poor performance influenced results. In contrast, the Avery study employed tests of executive functioning (category shift in the context of trail-making), which is known to be impaired in people with schizophrenia, and was correlated with negative symptoms in their participants. The possibility that associations reflected awareness of a genuine deficiency is therefore greater, although other studies indicate that such awareness may be generally limited (Cella et al., 2014). Our findings therefore suggest that the association of low AS with ANS pertains even to tasks on which ability is not objectively impaired.

Contrary to hypothesis, we found no relationship between ANS and AP. AP was rated highly, consistent with recent failures to replicate AP deficits (Gard et al., 2014). Findings may also reflect the recreational nature of the task. Comparison with a non-clinical group is necessary to elucidate.

There was a significant effect of trial on AS, which increased from baseline to Time 1 and from baseline to Time 2, but not from Time 1 to Time 2, suggesting that the imagery intervention is effective in changing anticipation, and that the effect is achieved during the first manipulation, rather than iteratively, or through repeated practice on the task. Ratings of AP also increased over trials, but the increase did not reach statistical significance. As the AP ratings are novel, we cannot compare with an existing body of literature. Nevertheless, our findings are consistent with a stronger role for anticipatory success.

We did not replicate previous research showing benefits specifically of positive imagery (e.g. Pictet et al., 2011; Nordin and Cumming, 2005). The lack of between group differences on any of the measures suggests that the positive imagery intervention was no more beneficial than a neutral imagery intervention. Imagining oneself doing the task, irrespective of outcome, may be sufficient to effect change, particularly in a sample with low baseline activity.

## 4.2 Limitations

This was a small study with participants selected for research purposes and, although overall ANS levels were moderate, unwillingness to participate may have precluded the involvement of those with the most severe symptoms. The inclusion criteria were driven primarily by those of the services where recruitment took place, and detailed information on variables such as illness length and medication levels was not collected. Participants were stratified for severity of negative symptoms using ad hoc, rather than published criteria, although these were determined a priori. Negative symptoms were assessed using the SANS, which has attracted some criticism, and replicating findings using scales specifically designed to overcome the shortcomings of the SANS (e.g. the Brief Negative Symptom Scale (Kirkpatrick et al., 2011; or the Clinical Assessment Interview for Negative Symptoms (Kring et al., 2013) will be an important future step.

The study was powered to detect the large effects reported by previous researchers. This was deemed appropriate for a preliminary investigation, and although participants with serious mental illness may be expected to show more variability in scores (and consequently smaller effect sizes), only the failure to find a significant change in AP scores appears attributable to issues of limited power. Effect sizes for the difference between positive and negative imagery are small, and further research would be required to determine the real-world meaning of rating scale change. Whilst the measures of AS and AP were closely tied to psychological theories of ANS, they were derived from sports psychology and pertained to a sports task, rather than self-defined recovery goals. The factors influencing AS and AP on a relatively low demand leisure activity may differ from those implicated in occupational functioning, and generaliseability of findings to other contexts should not be assumed without replication. Nevertheless, people with negative symptoms do not solely struggle with occupational activity, and increasing ability to engage in leisure pursuits is an important outcome. Correlational analyses preclude causal inferences about the association between baseline AS and ANS. An important limitation concerning the effect of the imagery manipulation was the lack of a control group of participants who did not listen to guided imagery. This means that we relied upon repetition of the task to assess the effect of practice, and any associated improvement in performance, on anticipation. A no-imagery condition should be included in future studies. The AP rating was novel, and, given the body of literature implicating poor AP in the maintenance of ANS, our findings suggesting AP is of less importance than AS should be treated with caution, and may have been due to limitations of measurement or design in our study.

## 4.3 Conclusion

Our findings support the development of imagery-based therapeutic interventions for ANS targeting anticipatory deficits. Collaborative development of imagery scripts with clients focusing on personal recovery goals could usefully augment existing thought-challenging approaches (Grant et al., 2012), subject to further controlled evaluation, faciliating engagement in meaningful and valued activity for this neglected group, and improving their quality of life.

Declaration of interests: None

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Figure 1: Anticipatory deficit model of Negative Symptoms

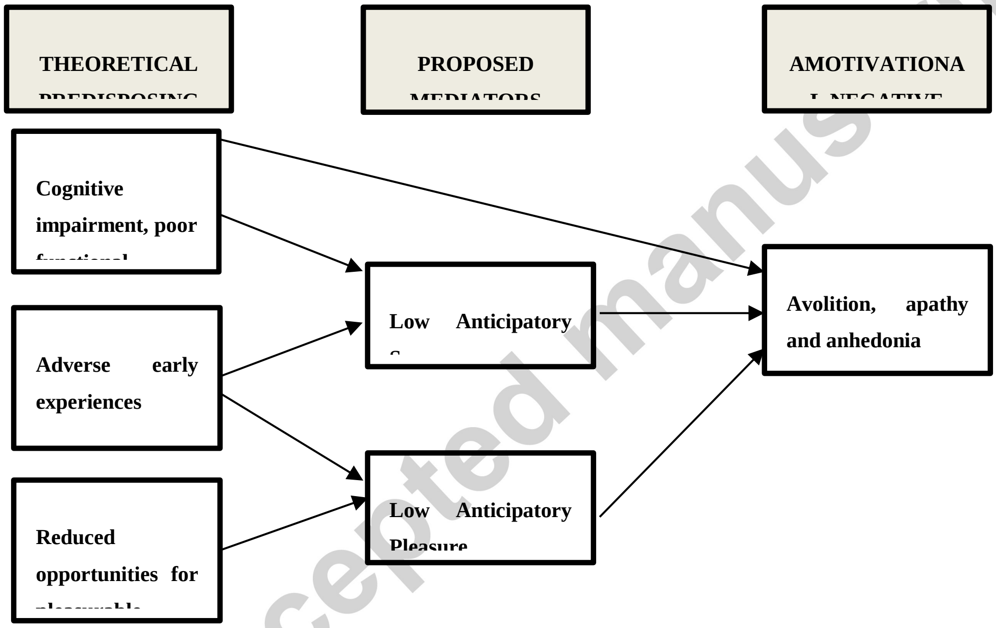




Table 1: Participant ratings of anticipatory success and anticipatory pleasure over time (n=42)

| | Timepoint (Mean, Standard Deviation) |
|---|---|

| | Baseline | | Trial 1 | | Trial 2 | |
|---|---|---|---|---|---|---|
| Anticipatory success (AS) | 23.62 | (4.03) | 31.48 | (4.87) | 36.65 | (5.01) |
| Anticipatory pleasure (AP) | 72.55 | (6.01) | 76.70 | (4.78) | 79.54 | (4.16) |

HIGHLIGHTS

- Previous research shows that negative symptoms are affected by anticipation.
- Negative symptom severity was associated with lower levels of anticipatory success.
- Anticipatory success improved after an imagery manipulation.
- Guided imagery can change the cognitive processes underlying negative symptoms.